

APPENDIX B: INFRASTRUCTURE DESIGN DETAILS

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Section B.1 General Provisions

B.1.1 Conformance with Thoroughfare Plan

The location and design of streets shall be in conformance with the adopted Metropolitan Planning Organization and China Grove Thoroughfare Plans. Right-of-way width and utility easements shall be dedicated where the Thoroughfare Plan indicates a wider cross section than currently exists.

B.1.2 General Engineering Standards

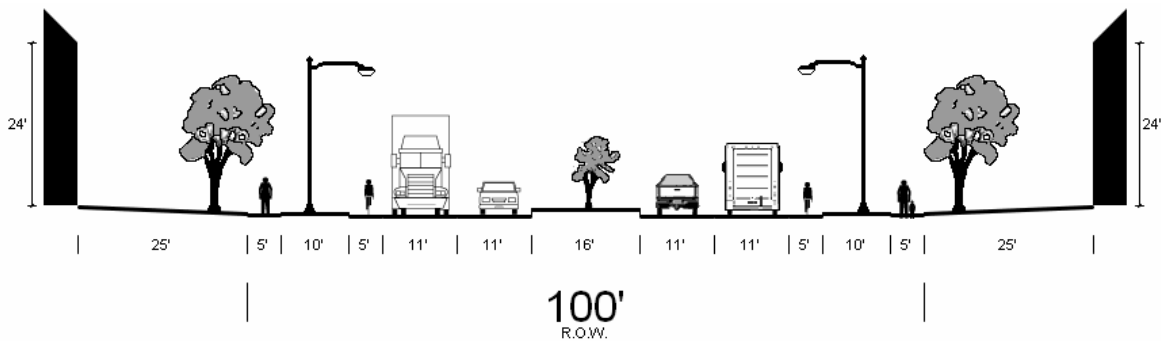
Unless otherwise specified in this Ordinance, design criteria shall meet current NCDOT standards.

Section B.2 Public Streets

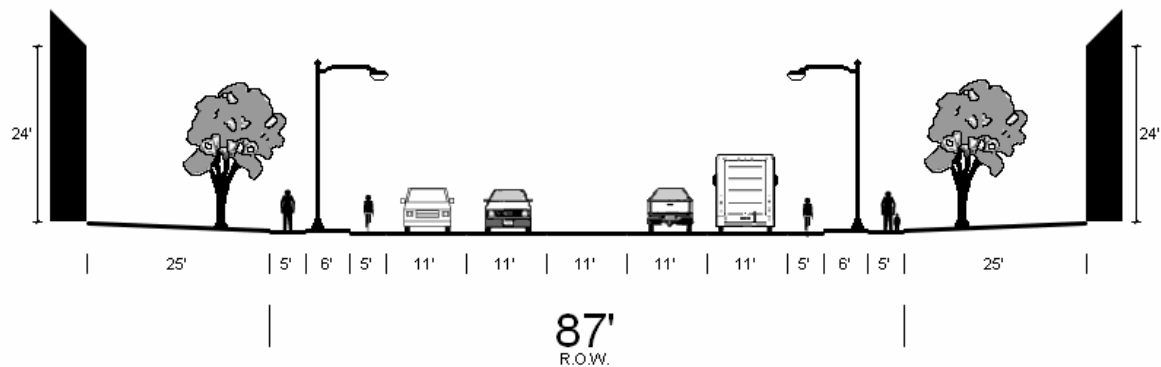
B.2.1 Street Categories

The following diagrams depict possible street sections for Category 3, Category 2, and Category 1 streets and alleys as outlined in Section 8.8.2 of this Ordinance. Widths shown are approximate. For specific standards see Section B.2.2.

Category 3 Streets

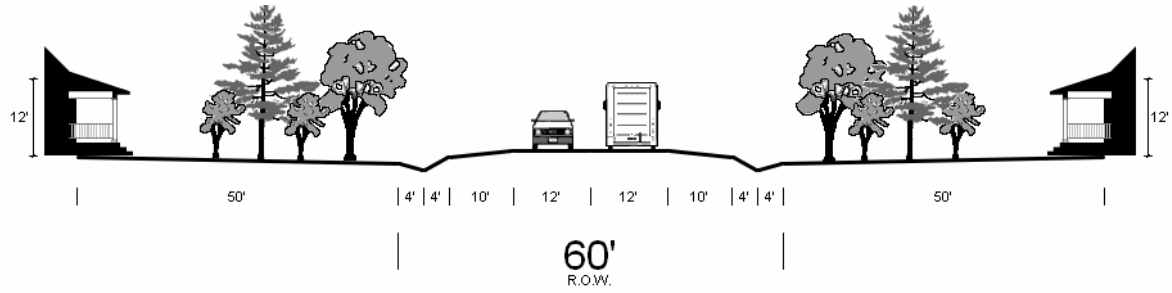


Thoroughfare Boulevard/Avenue



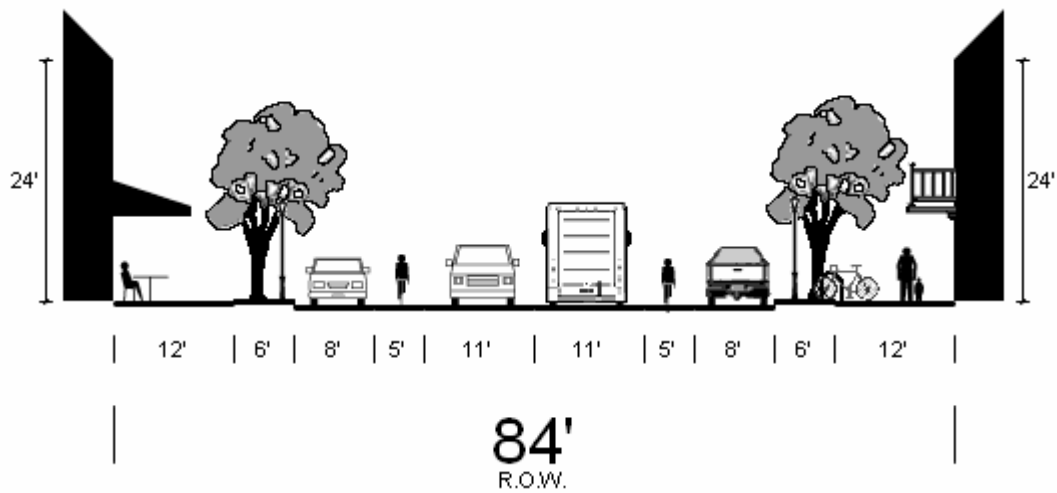
Thoroughfare Road

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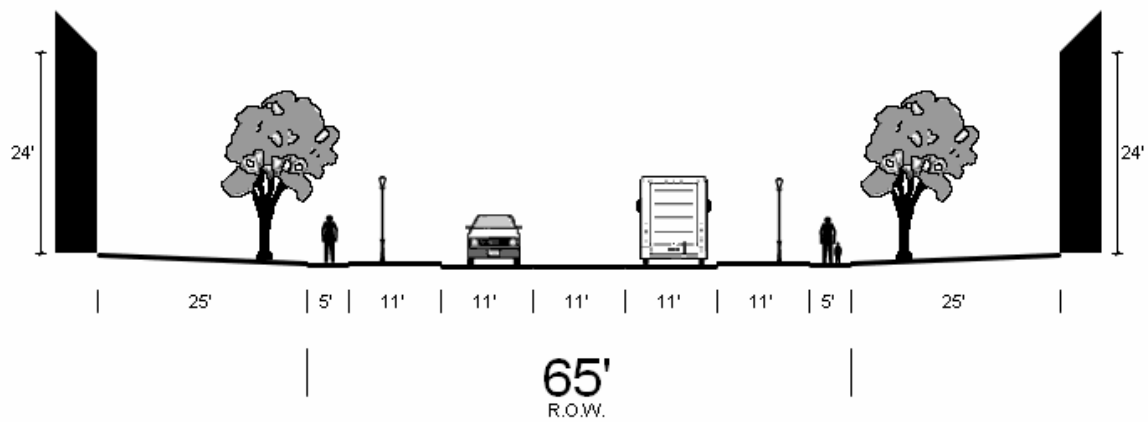


Rural Thoroughfare Road

Category 2 Streets



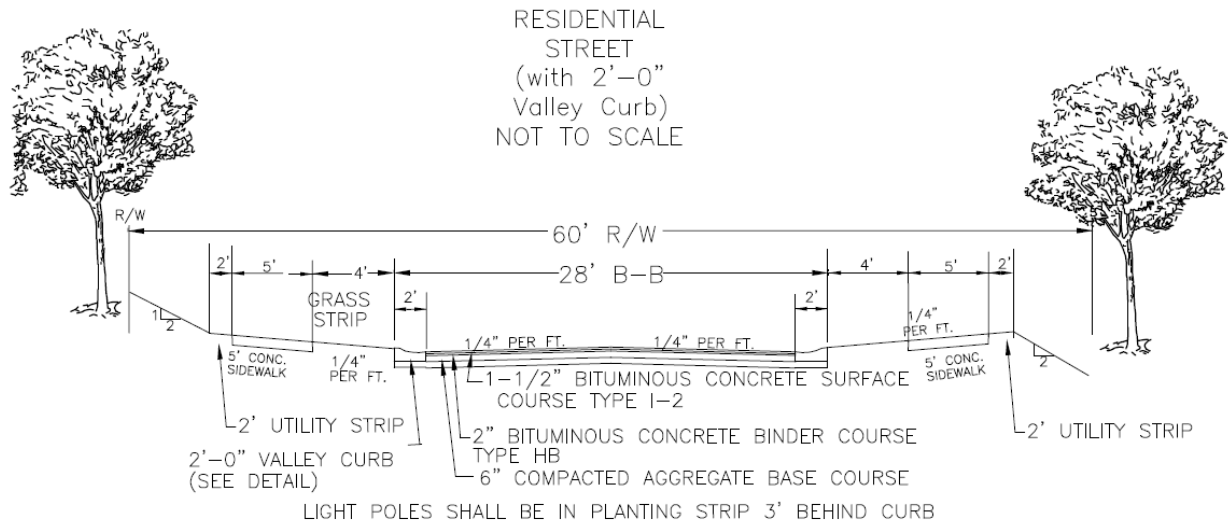
Main Street



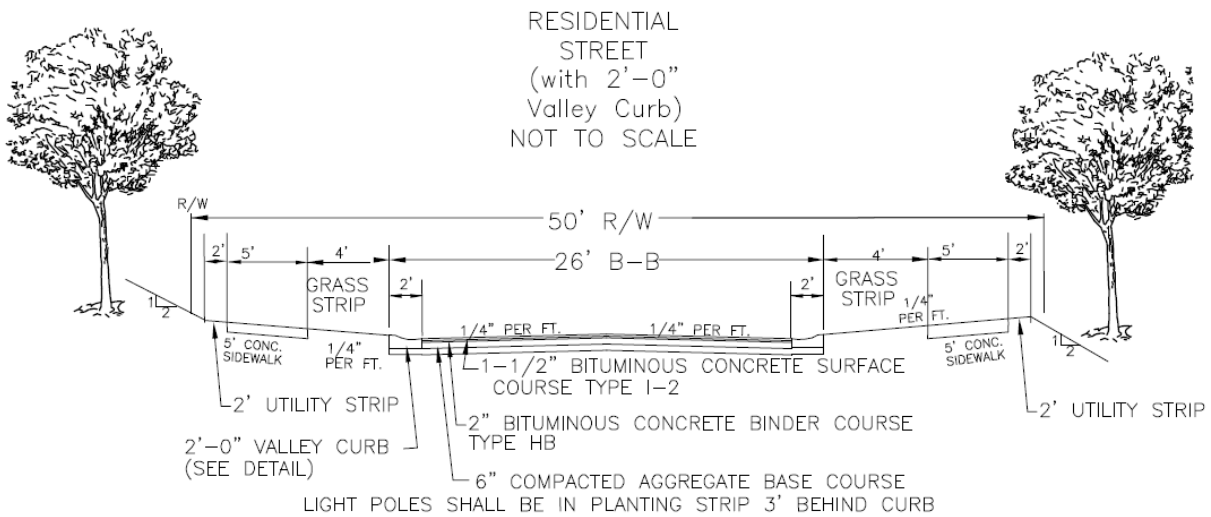
Collector Road

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Category 1 Streets



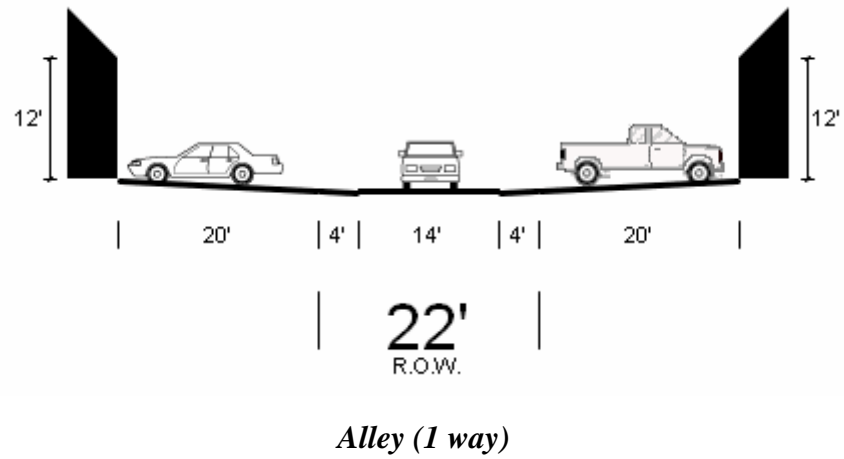
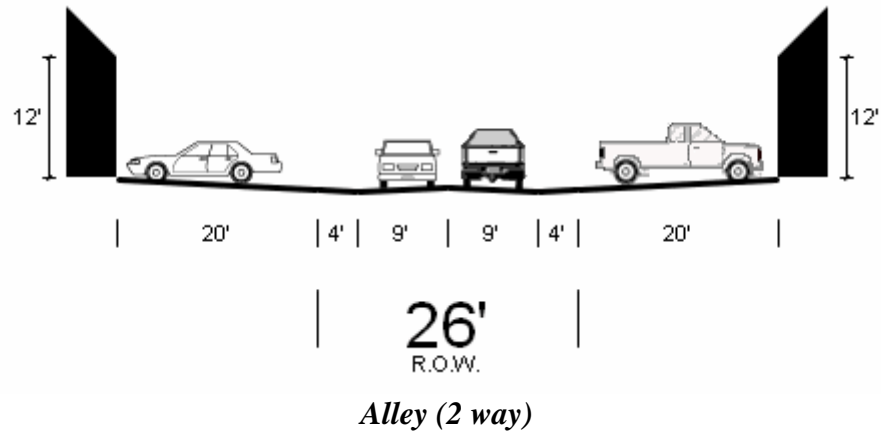
Residential Street (on-street parking both sides)



Residential Street (on-street Parking one side)

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Other



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B.2.2 Street Design Criteria by Street Type

Category 3

NCDOT Requirements shall be met.

<i>Element</i>	<i>Street Subcategory</i>		
	Thoroughfare Boulevard/Avenue	Thoroughfare Road	Thoroughfare Rural Road
Land Uses	Non-Residential	Non-residential	Non-residential & residential
Right-of-Way Width	80-100 feet	70-90 feet	60-80 feet
Number of Lanes	4-7	3-5	2-5
Lane Width	11-12 feet	11-12 feet	11-12 feet
Median Required	Yes-14 ft. min.	No	No
Bike Lane Required*	Yes	Yes	No
Design Speed	35-45 mph	30-45 mph	45-55 mph
On-street Parking Allowed	No	No	No
Sidewalks Required	Yes	Yes	No
Sidewalk Width (min.)	5 feet	5 feet	n/a
Planting Strip Width	6-15 feet	6-15 feet	n/a
Utility Area (min.)	10 feet (within planting strip & sidewalk width)	10 feet (within planting strip & sidewalk width)	15 feet
Street Suffixes	BLVD, AVE	RD	RD

*bike lane width to be dedicated

Category 2

<i>Element</i>	<i>Street Subcategory</i>	
	Main Street	Collector Road
Land Uses	Non-Residential & Residential	Non-Residential & Residential
Right-of-Way Width	60-85 feet	65-80 feet
Number of Lanes	2-5	3-4
Lane Width	11-12 feet	11-12 feet
Median Required	No	No
Bike Lane Required	No	No
Design Speed	20-35 mph	30-45 mph
On-street Parking Allowed	Yes-Required	Yes
Sidewalks Required	Yes	Yes
Sidewalk Width (min.)	10 feet	5 feet
Planting Strip Width	n/a	6-10 feet
Utility Area (min.)	10 feet (within sidewalk width)	10 feet (within planting strip & sidewalk width)
Street Suffixes	ST	ST, RD

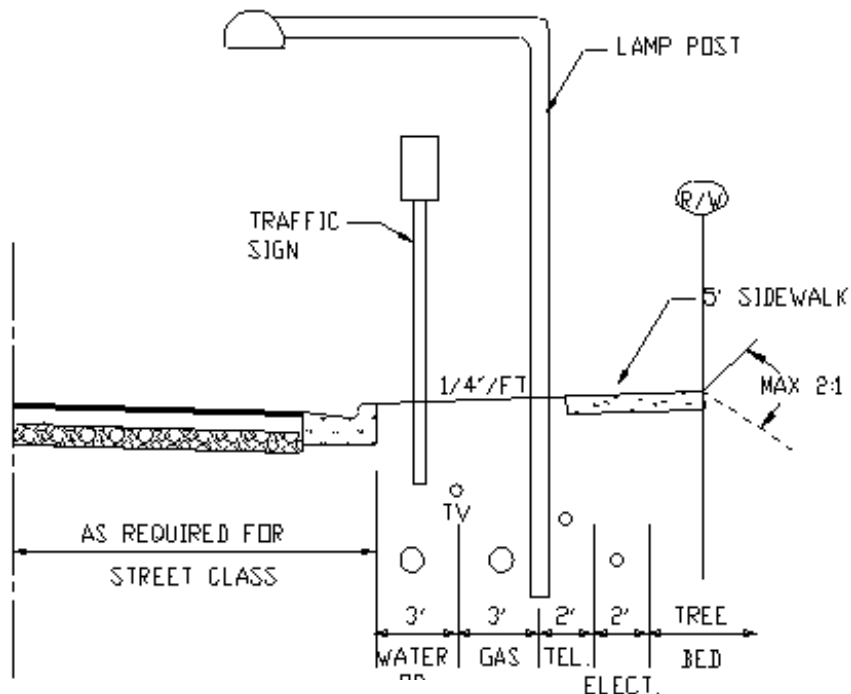
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Category 1 & Alleys

<i>Element</i>	<i>Street Subcategory</i>		
	Residential Street	Alley (two way)	Alley (one way)
Land Uses	Residential	Residential	Residential
Right-of-Way Width	50-65 feet	25-35 feet	20-25 feet
Number of Lanes	2	2	1
Lane Width	11-12 feet	9-11 feet	14-16 feet
Median Required	No	No	No
Bike Lane Required*	No	No	No
Design Speed	15-25 mph	5-10 mph	5-10 mph
On-street Parking Allowed	Yes	No	No
Sidewalks Required	Yes	No	No
Sidewalk Width (min.)	5 feet	n/a	n/a
Planting Strip Width	6 feet	n/a	n/a
Utility Area (min.)	10 feet (within planting strip & sidewalk width)	n/a	n/a
Street Suffixes	ST, LN, CT, CIR	ALLEY	ALLEY

B.2.3 Utility Location

- A. Utilities shall be located as depicted below within the planting strip and sidewalk areas. All electrical and telephone lines in new developments shall be buried. Sewer lines shall be located under the street pavement as approved by the Public Works Department. Lines shall be buried to the depth required by Public Works or the utility provider.



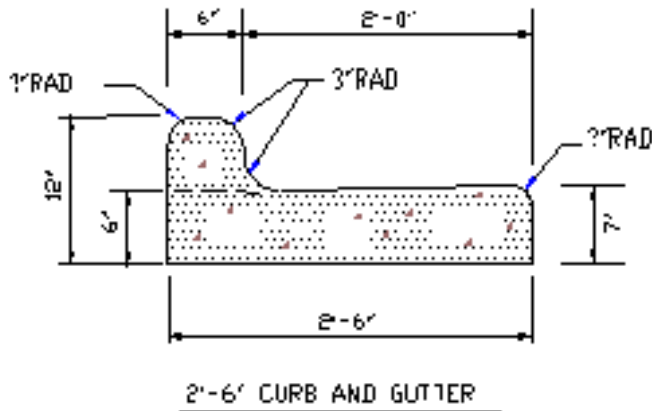
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- B. Utility pedestals shall be located minimum of two (2) feet behind the sidewalk and near property lines between buildings and shall be screened with a wall, fence, or evergreen landscaping.

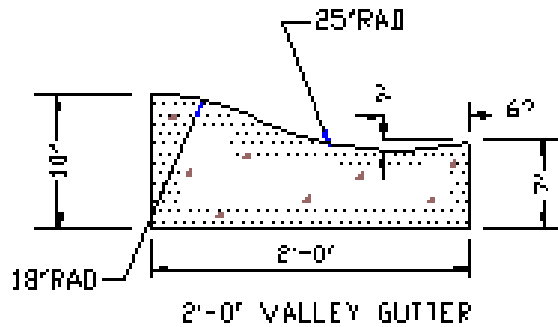
B.2.4 Curb and Gutter

The minimum width for vertical curb and gutter is two feet six inches (2'-6") and for valley curb and gutter is two feet (2'-0"). Below are details for vertical curb and gutter and valley curb and gutter.

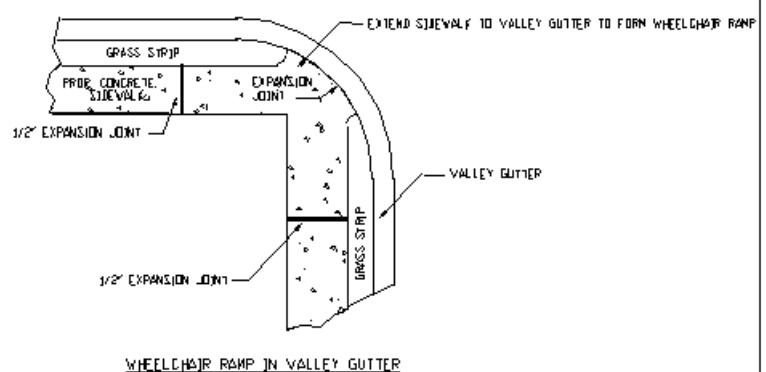
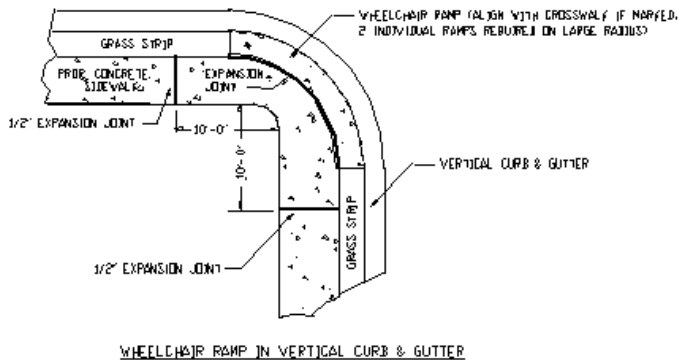
A. Vertical Curb and Gutter



B. Valley Curb and Gutter



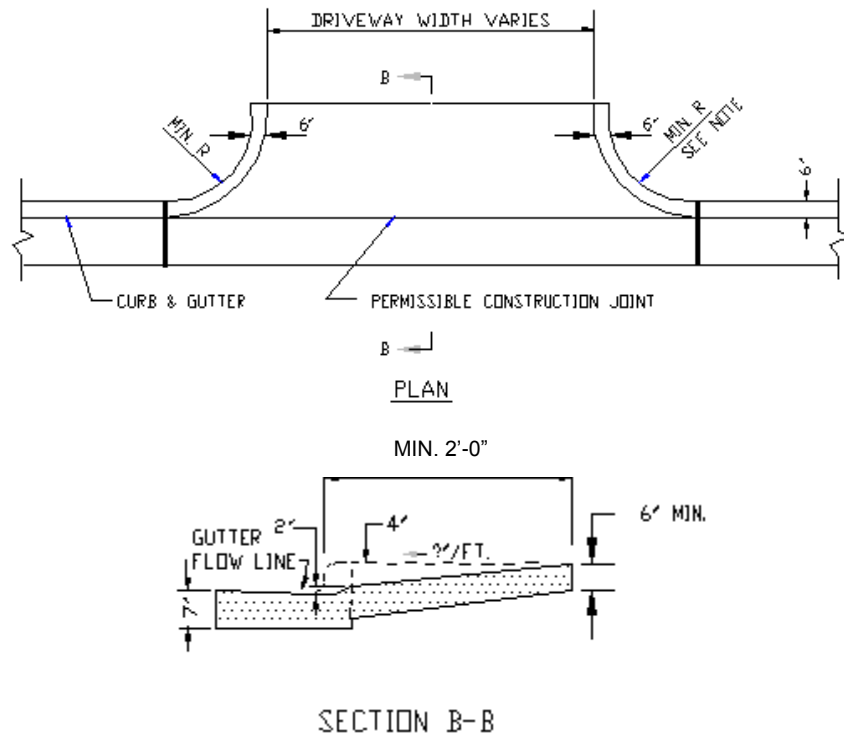
C. Wheelchair Ramp for Curb and Gutter



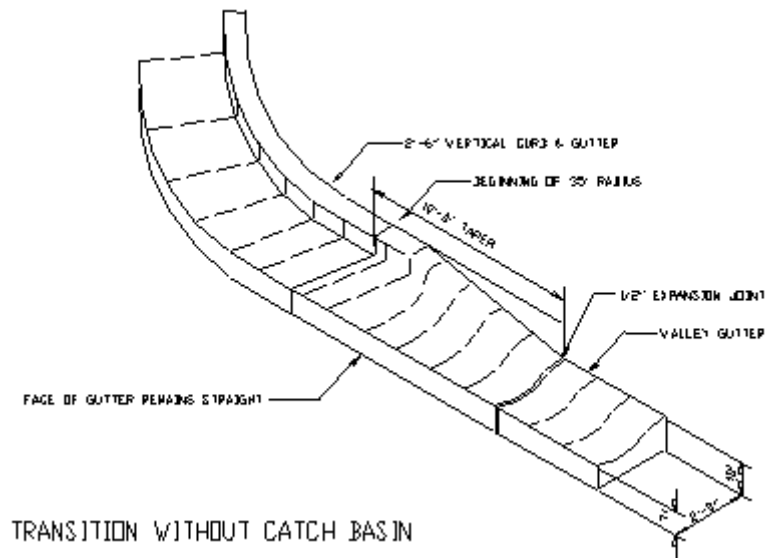
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D. Driveway Cuts in Curb and Gutter

Minimum turning radius for residential curb cuts is two feet (2'-0") and for commercial curb cuts is five feet (5'-0").



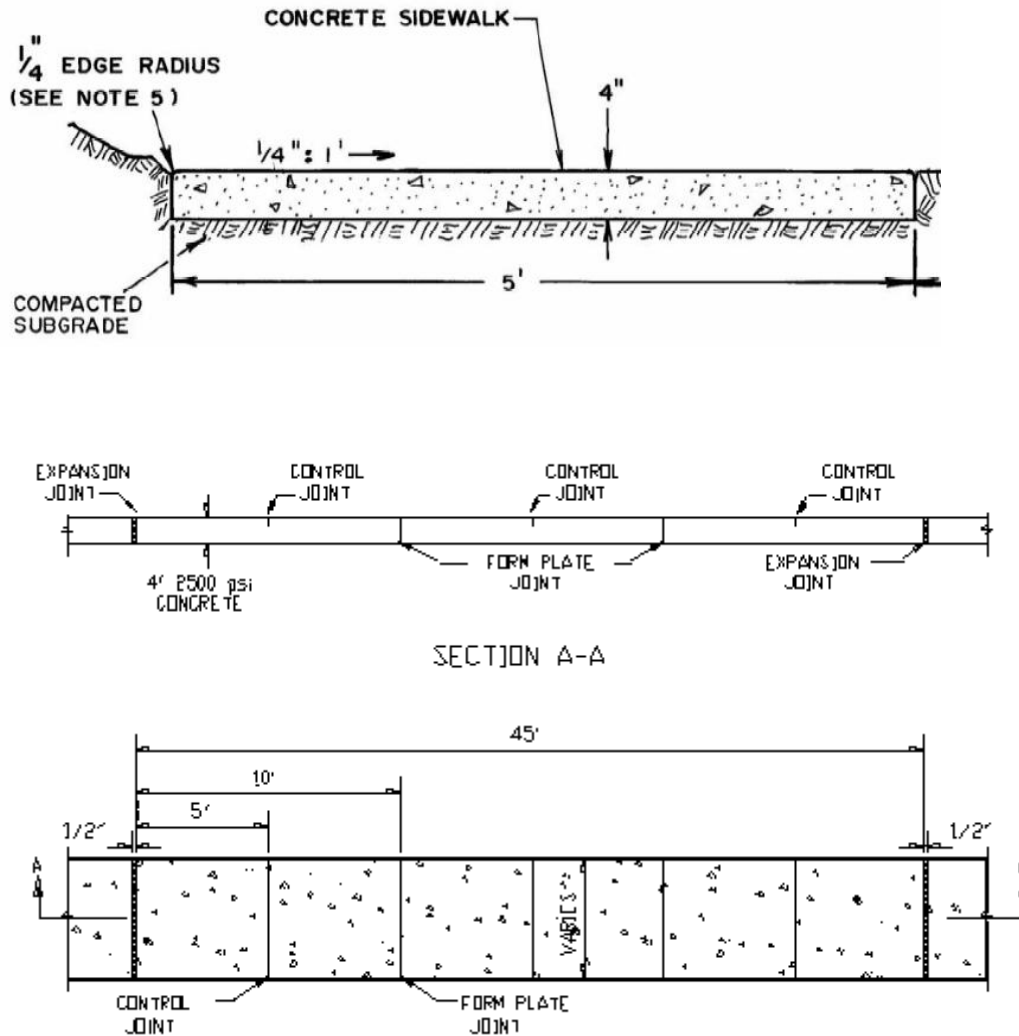
E. Curb and Gutter Transition at Cul-de-sac



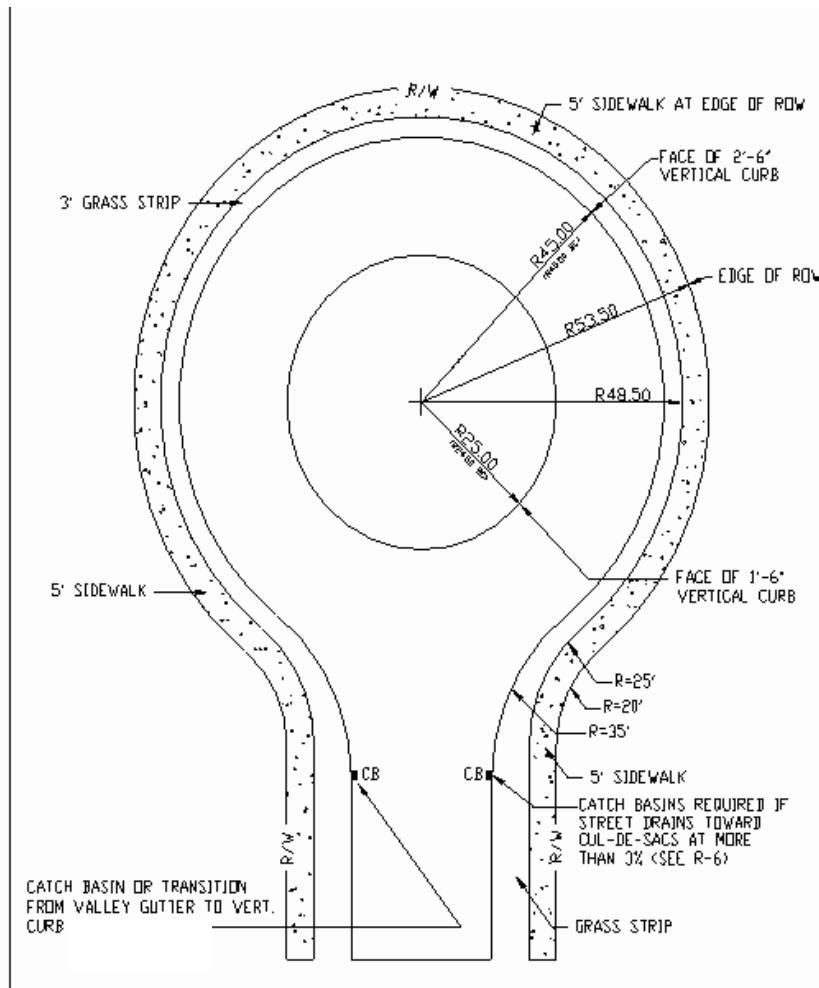
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B.2.5 Sidewalks

Sidewalks shall be at least five (5) feet wide. The minimum thickness of the concrete shall be four (4) inches. At vehicular traffic areas such as driveways the minimum thickness shall be six (6) inches. Also poured in place dummy joints shall be installed to match the width and expansion joints every 20 feet.



B.2.6 Cul-de-sacs



B.2.7 On-Street Parking

On-street parking shall be at least 8 feet wide and 22 feet long and be marked on the pavement.

B.2.8 Sight Distance

No planting, structure, sign, fence, wall, or obstruction greater than three (3) feet in height shall be placed or maintained within the sight triangle. The sight triangle shall be formed by the intersecting street centerlines and a straight line connecting points on the street centerlines, each of which is 75 feet for minor streets and 150 feet for major streets in distance from the point of the intersection.

B.2.9 Access Management & Intersections

- A. **Driveways:** The number of street and driveway connections permitted serving a single property frontage or commercial development shall be the minimum deemed necessary by the Town Engineer or NCDOT for reasonable service to the property without undue impairment of safety, convenience, and utility of the roadway. Normally, not more than two driveways shall be permitted for any single property frontage. The arrangement of driveways should be related to adjacent driveways and nearby street intersections and meet the following criteria:

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- Driveways accessing local or collector type streets shall be at least 100 feet from the point of tangency of the radius curvature of the next intersecting street.
- Driveways serving traffic volumes in excess of 300 ADT or accessing thoroughfares shall be located a minimum of 250 feet from the point of tangency of the radius of curvature of the intersecting street.
- Where two driveways are proposed along a single property frontage to facilitate operations, the minimum distance between the centerlines of the drives shall be 200 feet.
- The minimum distance between the centerlines of driveways into shopping centers or facilities generating in excess of 300 ADT shall be a minimum of 400 feet.
- Full access driveways open to signalization should be 1000 feet apart. Driveways which access thoroughfares and serve more than 1500 ADT shall provide deceleration lanes in approach to the driveway.
- Residential drives shall be located a minimum of 10 feet from the point of tangency of curb radii of street intersections.

B. Street Alignment and Separation:

- There shall be a minimum of 200 feet between centerlines of street jogs on collectors and arterials. Local streets shall not be offset less than 125 feet from their centerline.
- Median breaks shall be provided to allow safe and efficient movement of traffic. The desirable spacing of median breaks shall be at 1000 foot intervals, with the minimum allowable spacing to be at 500' intervals.
- Intersections of roadways controlled by a traffic signal should be spaced along roadways at the following intervals:

Street Category	Interval Spacing
Category 3	2,620-5,280 feet
Category 2	1,310 feet
Category 1	1,000 feet

- Four legged intersections not controlled by a traffic signal should be spaced along roadways at the following intervals:

Street Category	Interval Spacing
Category 3	1,000 feet
Category 2	750 feet
Category 1	300 feet

- Three legged intersections not controlled by a traffic signal should be spaced along roadways at the following intervals:

Street Category	Interval Spacing
Category 3	800 feet
Category 2	500 feet
Category 1	200 feet

Intersections with unique circumstances may be ideal for roundabouts. Roundabouts shall meet NCDOT standards.



Section B.3 Water and Sewer

B.3.1 Water Line Size and Design

- A. Water main line size is based on current North Carolina Department of Environment and Natural Resources (NCDENR) requirements. Actual line sizes shall be determined by the Utilities Director based on flow requirements and line extendibility.
- B. Every effort shall be made not to create dead-end or non-looped lines.
- C. Water service lines for single-family residential units shall not be less than three-fourths (3/4) inch and shall be constructed of K-copper. Services for larger units shall be sized according to flow requirements.
- D. The angle of connection for water taps shall be between 45 degrees and 90 degrees from the top.

B.3.2 Sewer Line Size and Design

- A. Sewer main line sizes are to be based on current engineering practices, in accordance with state requirements. Final size will be determined by the Utilities Director and further based on line extendibility.
- B. Sewer service lines shall not be less than four (4) inches and shall be constructed of Schedule 40 PVC.
- C. The angle of connection for sewer taps shall be at least 90 degrees from the top.

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Section B.4 Stormwater Management

The Section is reserved for future Phase II Stormwater Requirements as required by the North Carolina Department of Environment and Natural Resources.

Section B.5 Fire Protection

Fire hydrants shall be approved brand only. The Town maintains a uniform hydrant program with Muller Centurion, five and one-fourth (5 ¼") inch valve, left hand open hydrants with two hose nozzles and one pumper nozzle.